

MATERIAL SPECIFICATIONS

APPLICABLE ASTM SPECIFICATIONS

Nominal Group No.	GROUP 1 MATERIALS			PRODUCT FORMS			
	Nominal Designation Steel	Forgings		Castings		Plates	
		Spec.—Gr.	Notes	Spec.—Gr.	Notes	Spec.—Gr.	Notes
1.1	Carbon	A105	(1)(3)	A216—WCB	(1)	A515.70	(1)
		A350—LF2				A516.70	(1)
	C—Min Si					A537, C1.1	
1.2	Carbon			A216—WCC	(1)		
				A352—LCC			
	2 1/2 Ni			A352—LC2		A203—B	
	3 1/2 Ni	A350—LF3		A352—LC3		A302—E	
1.3	Carbon			A352—LCB	(1)	A203—A	
						A203—D	
						A515—65	
						A516—65	
1.4	Carbon					A515—60	(1)
		A350—LF1				A515—60	
1.5	C—1/2 Mo	A182—F1	(2)	A217—WC1	(2)(4)	A204—A	(2)
				A352—LC1		A204—B	(2)
1.7	C—1/2 Mo					A204—C	(2)
	1/2Cr—1/2 Mo	A182—F2					
	Ni—Cr—1/2 Mo			A217—WC4	(4)		
	Ni—Cr—1 Mo			A217—WC5	(4)		
1.9	1 Cr—1/2 Mo	A182—F12	(4)				
	1 1/4Cr—1/2 Mo	A182—F11	(4)	A217—WC6	(4)	A378—11	C1.2
1.10	2 1/4Cr—1 Mo	A182—F22		A217—WC9	(4)	A378—22	C1.2
1.13	5 Cr—1/2 Mo	A181—F5		A217—C5	(4)		
		A181—F5a					
1.14	9 Cr—1 Mo	A182—F9		A217—C12	(4)		

Nominal Group No.	GROUP 1 MATERIALS		PRODUCT FORMS	
2.1	18 Cr—8 Ni	A182—F304 (5)	A351—CF3	A240—304 (5)(6)
	18 Cr—8 Ni	A182—F304H	A351—CF8 (5)	A240—304H
2.2	16 Cr—12 Ni—2 Mo	A182—F316 (5)		A240—316 (5)(6)
		A182—F316H		A240—316H
	18 Cr—13 Ni—3 Mo		(1)	A240—317 (5)(6)
	18 Cr—9 Ni—2 Mo		A351—CF3M	
2.3			A351—CF8M	
	18Cr—8 Ni	A182—F304L		A240—304L
	16 Cr—12 Ni—2 Mo	A182—F316L		A240—316L
2.4	18 Cr—10 Ni—Ti	A182—F321 (5)		A240—321 (5)(6)
		A182—F321H		A240—321H
2.5	18 Cr—10 Ni—Cb	A182—F347 (5)	A351—CF8C	A240—347 (5)(6)
		A182—F347H		A240—347H
		A182—F348 (5)		A240—348 (5)(6)
		A182—F348H		A240—348H
2.6	25 Cr—12 Ni		A351—CH8 (5)	
			A351—CH20 (5)	
	23 Cr—12 Ni			A240—309S (5)(6)
2.7	25 Cr—12 Ni	A182—F310 (5)(9)	A351—CK20	A240—310S (5)(6)(7)

General Notes

- a) For temperature limitations see footnotes in Tables 2 and in Annex G.
b) Plate materials are listed only for use as blind flanges(see 5.1). Additional plate materials listed in ANSI B16.34 may also be used, with corresponding B16.34 Standard Class ratings.
c) Material Groups not listed Table 1A are intended for use in valves. See ANSI B16.34

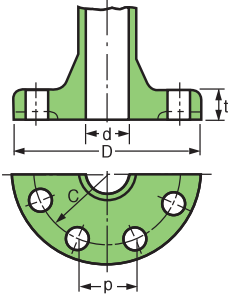
Notes

- (1) Upon prolonged exposure to temperatures above about 800°F(425°C), the carbide phase of carbon steel may be converted to graphite.
(2) Upon prolonged exposure to temperatures above about 875°F(470°C), the carbide phase of carbon-molybdenum steel may be converted to graphite.
(3) Only killed steel shall be used above 850°F(455°C)
(4) Use normalized and tempered material only.
(5) At temperatures above 1000°F(540°C), use only when the carbon content is 0.04 percent or higher.
(6) For temperatures above 1000°F(540°C), use only if the material is heat treated by heating it to a temperature of at least 1900°F(1040°C)and quenching in water or rapidly cooling by other means.
(7) Service temperatures of 1050°F(565°C)and above should be used only when assurance is provided that grain size is not finer than ASTM No.6

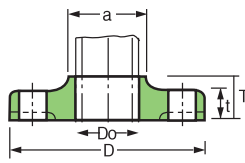
TOLERANCES

ASME B16.5-2020ED FORGED FLANGES

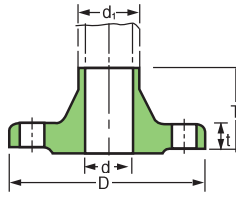
SOLID FLANGE



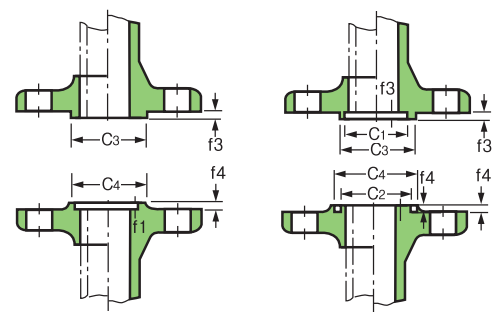
SLIP-ON FLANGE



WELDING NECK FLANGE



TYPE OF GASKET SURFACE



MALE & FEMALE TYPE

TONGUE & GROOVE TYPE

THREAD, SOCKET-WELDING, SLIP-ON, LAP JOINT AND BLIND.

Place		Range	Tolerance (mm)
Outside Diameter		When O.D. is 24" or Less When O.D. is Over 24"	$\pm 1.6 (\pm 0.063 \text{ in})$ $\pm 3.2^* (\pm 0.125 \text{ in})$
Inside Diameter	Counterbores Thread	When O.D. is 10" or Less When O.D. is 12" and Over	$+1.0 (+0.03 \text{ in})$ $-0.0 (-0.0 \text{ in})$ $+1.5 (+0.06 \text{ in})$ $-0.09 (-0.0 \text{ in})$
	Counterbores Socket Welding	$1/2 \leq \text{NPS} \leq 3$	$\pm 0.25 (\pm 0.01 \text{ in})$
	Lap-Joint Slip-On Socket Welding	When O.D. is 10" or less When O.D. is 12" and over	$+1.0 (+0.03 \text{ in})$ $-0.0 (-0.0 \text{ in})$ $+1.5 (+0.06 \text{ in})$ $-0.0 (-0.0 \text{ in})$
Diameter of Contact Face		1.5mm Raised Face (Outside)	$\pm 1.0 (0.03 \text{ in})$
		6.4mm Raised Face (Outside)	$\pm 0.5 (\pm 0.02 \text{ in})$
		Tongue, groove, female (Inside & Outside)	$\pm 0.5 (\pm 0.02 \text{ in})$
Diameter of Hub at Base		When Hub Base is 24" or Smaller When Hub Base is Over 24"	$\pm 1.6^* (\pm 0.063 \text{ in})$ $\pm 3.2^* (\pm 0.125 \text{ in})$
Drilling		Bolt Circle Diameter	$\pm 1.5 (\pm 0.06 \text{ in})$
		Bolt to Bolt Hole	$\pm 0.8 (\pm 0.03 \text{ in})$
		Diam. of Bolt Hole	$\pm 0.8^* (\pm 0.03 \text{ in})$
		Eccentricity of Bolt Circle with Respect to Facing	$\text{NPS} \leq 2 \frac{1}{2}$ $\pm 0.8 (0.03 \text{ in}) \text{ Max.}$ $\text{NPS} \leq 3$ $\pm 1.5 (0.03 \text{ in}) \text{ Max.}$
		Eccentricity of Bolt Circle with Respect to bore	$0.8 \text{ Max.}^* (0.03 \text{ in})$
		Eccentricity of Facing with Respect to Bore	$0.8 \text{ Max.}^* (0.03 \text{ in})$
Thickness		When O.D. is 18" or Less When O.D. is 20" and Over	$+3.0 (+0.12 \text{ in})$ $-0.0 (-0.0 \text{ in})$ $+5.0 (+0.19 \text{ in})$ $-0.0 (-0.0 \text{ in})$
Length Thru Hub		When O.D. is 4" or Less 5" thru 10" When O.D. is 12" and Over	$\pm 1.5 (\pm 0.06 \text{ in})$ $+1.5 (+0.06 \text{ in})$ $-3.0 (-0.12 \text{ in})$ $+3.0 (+0.12 \text{ in})$ $-5.0 (-0.18 \text{ in})$

WELDING NECK

Place	Range	Tolerance (mm)
Outside Diameter	When O.D. is 24" or Less When O.D. is Over 24"	$\pm 1.6 (\pm 0.063 \text{ in})$ $\pm 3.2^* (\pm 0.125 \text{ in})$
Inside Diameter	10" and Smaller 12" thru 18" 20" and Larger	$\pm 1.0 (\pm 0.03 \text{ in})$ $\pm 1.5 (0.06 \text{ in})$ $+3.0 (+0.12 \text{ in})$ $-1.5 (-0.06 \text{ in})$
Diameter of Contact Face	1.5mm Raised Face (Outside)	$\pm 1.0 (\pm 0.03 \text{ in})$
	6.4mm Raised Face (Outside)	$\pm 0.5 (\pm 0.02 \text{ in})$
	Tongue, groove, female (Inside & Outside)	$\pm 0.5 (\pm 0.02 \text{ in})$
Diameter of Hub at Base	When Hub Base is 24" or Smaller When Hub Base is Over 24"	$\pm 1.6 (0.063 \text{ in})$ $\pm 3.2^* (0.125 \text{ in})$
Diameter of Hub at Point of Welding	When O.D. is 5" or Less When O.D. is 6" and Over	$+2.0 (+0.09 \text{ in})$ $-1.0 (-0.03 \text{ in})$ $+4.0 (+0.16 \text{ in})$ $-1.0 (0.03 \text{ in})$
Drilling	Bolt Circle Diameter	$\pm 1.5 (\pm 0.06 \text{ in})$
	Bolt to Bolt Hole	$\pm 0.8 (\pm 0.03 \text{ in})$
	Diam. of Bolt Hole	$\pm 0.8^* (\pm 0.03 \text{ in})$
	Eccentricity of Bolt Circle with Respect to Facing	$\text{NPS} \leq 2 \frac{1}{2}$ $0.8 (0.03 \text{ in}) \text{ Max.}$ $\text{NPS} \leq 3$ $1.5 (0.06 \text{ in}) \text{ Max.}$
	Eccentricity of Bolt Circle with Respect to Bore	$0.8 \text{ Max.}^* (0.03 \text{ in})$
	Eccentricity of Facing with Respect to Bore	$0.8 \text{ Max.}^* (0.03 \text{ in})$
Thickness	When O.D. is 18" or Less When O.D. is 20" and Over	$+3.0 (+0.12 \text{ in})$ $-0.0 (-0.0 \text{ in})$ $+5.0 (+0.19 \text{ in})$ $-0.0 (-0.0 \text{ in})$
Length Thru Hub	When O.D. is 4" or Less When O.D. is 5" thru 10" When O.D. is 12" and Over	$\pm 1.5 (\pm 0.06 \text{ in})$ $+1.5 (0.06 \text{ in})$ $-3.0 (-0.12 \text{ in})$ $+3.0 (+0.12 \text{ in})$ $-5.0 (-0.18 \text{ in})$

Note: *This tolerance is not covered in ANSI B16.5, but maker's option.

TOLERANCES

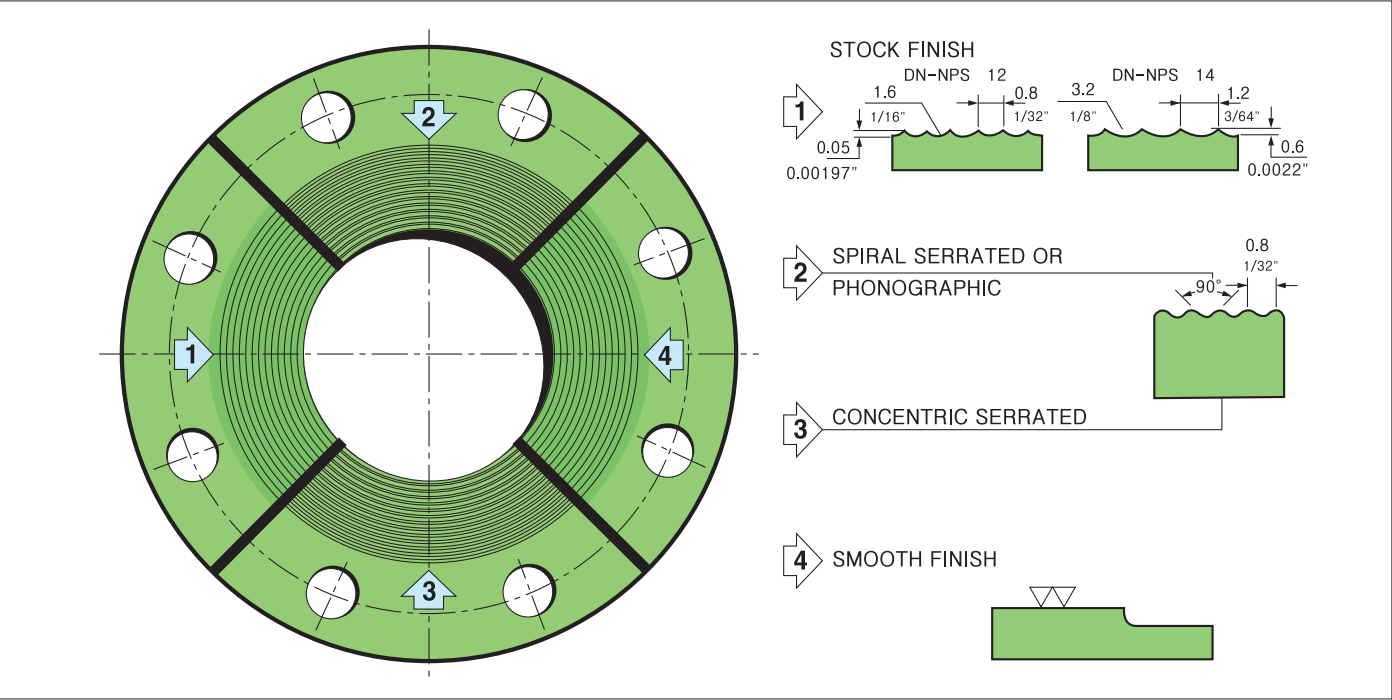
JPI-7S-15-84 FORGED FLANGES

Flange Section		Basic Size	Dimensional Tolerance
Outside Diameter O		610mm & below over 610mm	± 1.6 ± 3.2
Inside Diameter	Slip-on & Lap Joint Bo	10B & below	+0.8, -0
		12B & over	± 1.6, -0
	Socket-Welding Bo, B	$\frac{1}{2}$ B ~ 2B	+0.3, -0
		$2\frac{1}{2}$ B ~ 3B	+0.4, -0
		$\frac{1}{2}$ B ~ 2B	± 0.4
		$2\frac{1}{2}$ B ~ 3B	± 0.8
	Welding-Neck B	10B & below	± 0.8
		12B-18B	± 1.6
20B & over		± 3.2	
		-0	
Thickness O		18B & below	+3.2
			-0
		20B & over	+4.8 -0
Bolt Circle Diameter C		12B & below	± 0.8
Bolt Hole Diameter		14B & over	± 1.0

Flange Section		Basic Size	Dimensional Tolerance
Bolt Hole Pitch		24B & below	±0.5
Hub Diameter	Slip-on & Socket X1	12B & below	±1.6 -0.8
		14B & over	+3.2 -1.6
	Welding-Neck X	610B & below	±1.6
		610 & over	±3.2
	Welding-Neck H	5B & below	+2.4 -0.8
		6B & over	+4.0 -0.8
Hub Height Y			Slip-on & Socket Y1
	20B & over	+4.8, -1.6	
	Welding Neck Y	10B & below	±1.6
		12B & over	±3.2
Gasket Seat R		RFThickness 1.6mm	±0.8
		RFThickness 0.4mm R	±0.5

STANDARD FINISH

STANDARD FINISHES for Face of Flange (ASME B16.5)



STOCK FINISH :

The most widely used of any gasket finish, because practically, is suitable for all ordinary service conditions. This is a continuous spiral groove. Flanges sizes 12" (304.8mm) and smaller are produced with a 1/16" round-nosed tool at a feed of 1/32" per revolution. For sizes 14" (355.6mm) and larger, the finish is made with 1/8" round-nosed tool at a feed of 3/64" per revolution.

SPIRAL SERRATED OR PHONOGRAPHIC :

This finish is produced by using a 90° round-nosed tool.

CONCENTRIC SERRATED :

This finish is produced by using a 90° round-nosed tool.

SMOOTH FINISH : T

he cutting tool employed shall have an approximate 0.06" radius.

The resultant surface finish shall have a 125μ inch to 250μ inch (ANSI B16.5 para 6.4.5)